Total Lightning Activities during Recent Extreme Weather Events in Japan

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In this paper, we will demonstrate the recent results from Japanese Total Lightning Detection Network (JTLN) in relation with extreme weather events occurred in Japan in the period of 2014-2017 such as wind gusts, tornadoes, heavy precipitation. Automatic thunderstorm cell tracking was carried out based both on total lightning (TL) positions and very high spatial and temporal resolution X-band MP radar echo data (1 min and 250 m) around extreme weather events. Results obtained indicate promising because the number of TL tends to increase about $10 \sim 40$ minutes before the onset of many of wind gust events. We also highlight the differences in lightning and background meteorological characteristics of thunderstorm cells between wind gust events and non-windgust events, which is a vital information to improve the prediction efficiency. Positive linear relation with high cross correlation ($r \sim 0.87$) between TL and Precipitation Volume (PV) [m^3] has been obtained. The cross correlation between TL and PV is much higher than that for cloud-to-ground lightning (CG) and PV. Although the slope of linear relation (TL vs. PV) varies depending on heavy rain events, TL can be promising tool to estimate severe rainfall without radar information in the remote area.